



Sam Middleton, P.E. PTOE

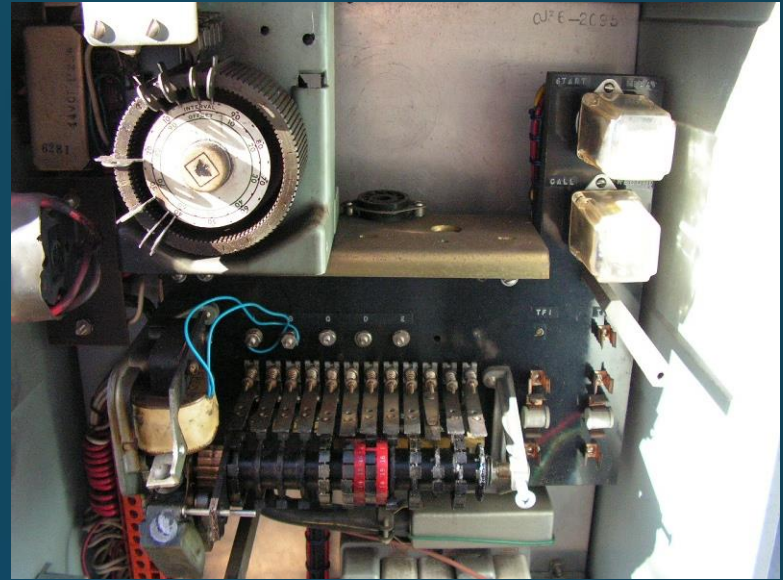
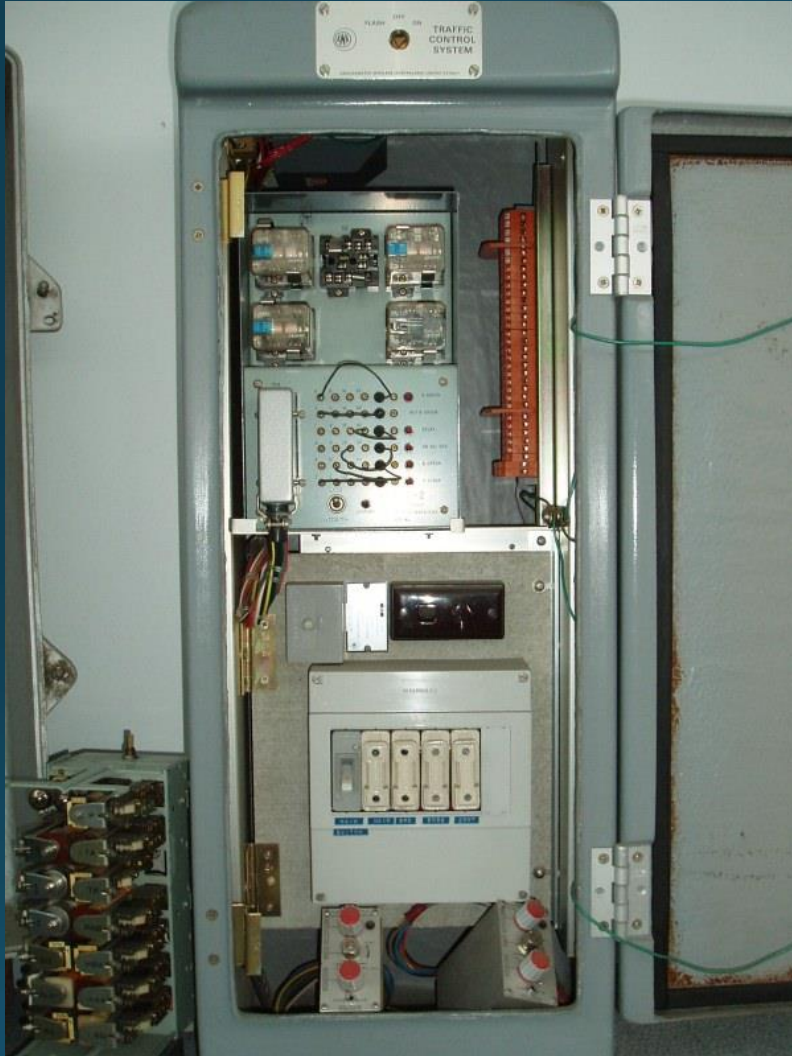
Pete Yauch, P.E. PTOE

Traffic Signal Design Considerations



Sam Middleton, P.E., PTOE

Detection



Challenges

- Users
- Construction
- Maintenance

Purpose

- Tells Controller Demand Exists
- Right of Way Assignment

Detection Types

- Active
- Passive

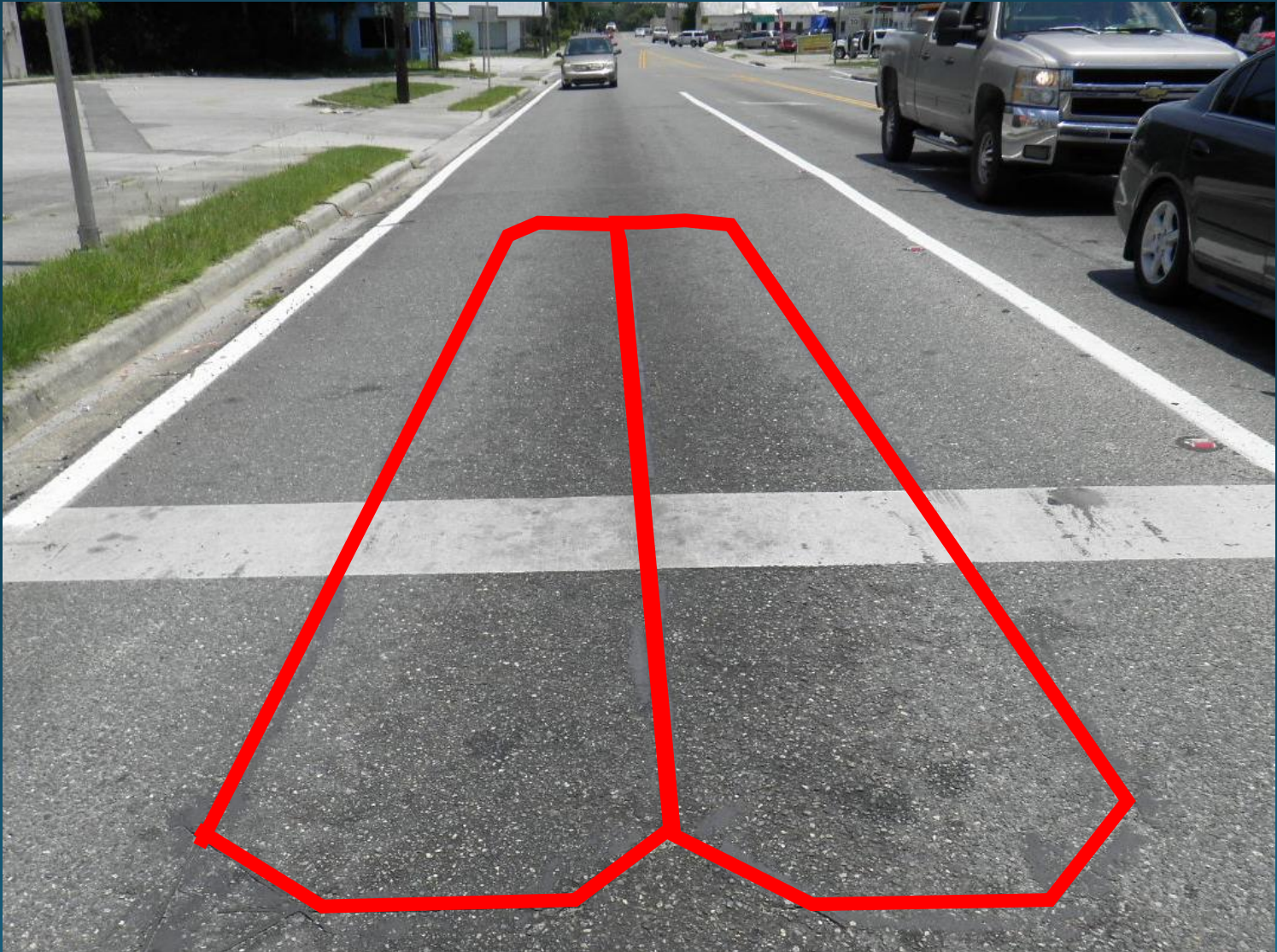
Active Detection



Passive

- Detector types
 - Loops
 - Video
 - Magnetometers

Loops



Loops

- Pay item
 - 660-1
 - 660-2

660-1

SHELF MOUNTED

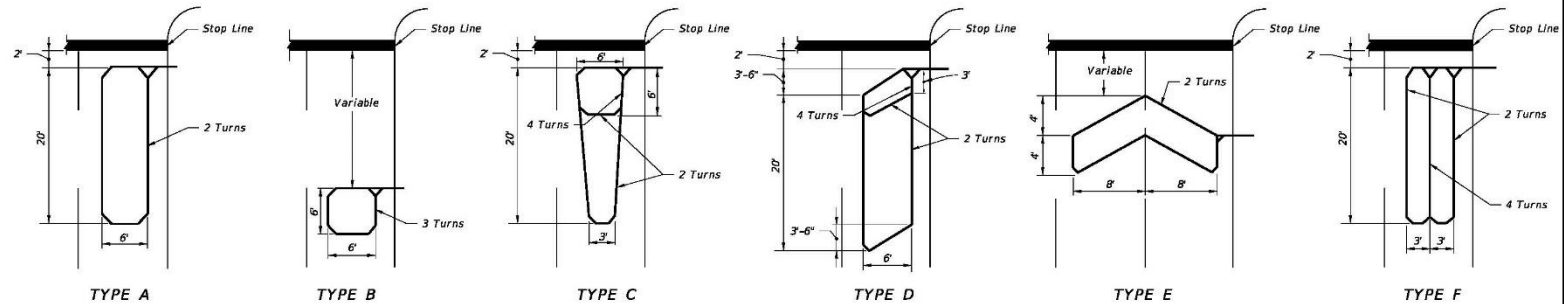


660-1

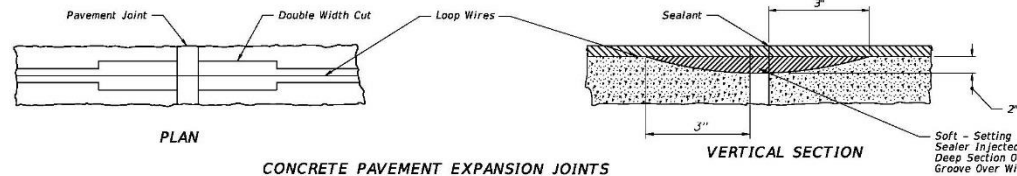
RACK MOUNTED



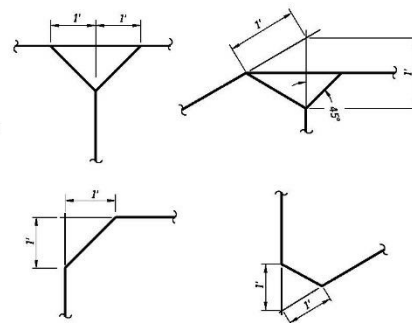
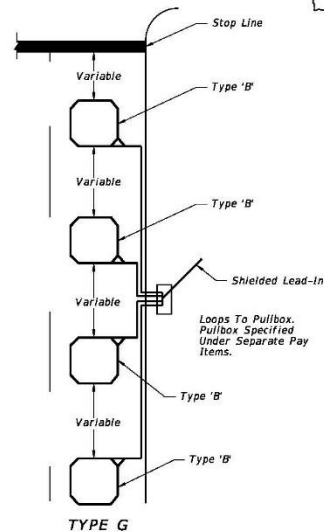
660-2



Note:
Loop conductors must follow
saw-cut to bottom forming
slack section at joint.



CONCRETE PAVEMENT EXPANSION JOINTS



LOOP CORNER AND LEAD-IN DETAILS

Notes:

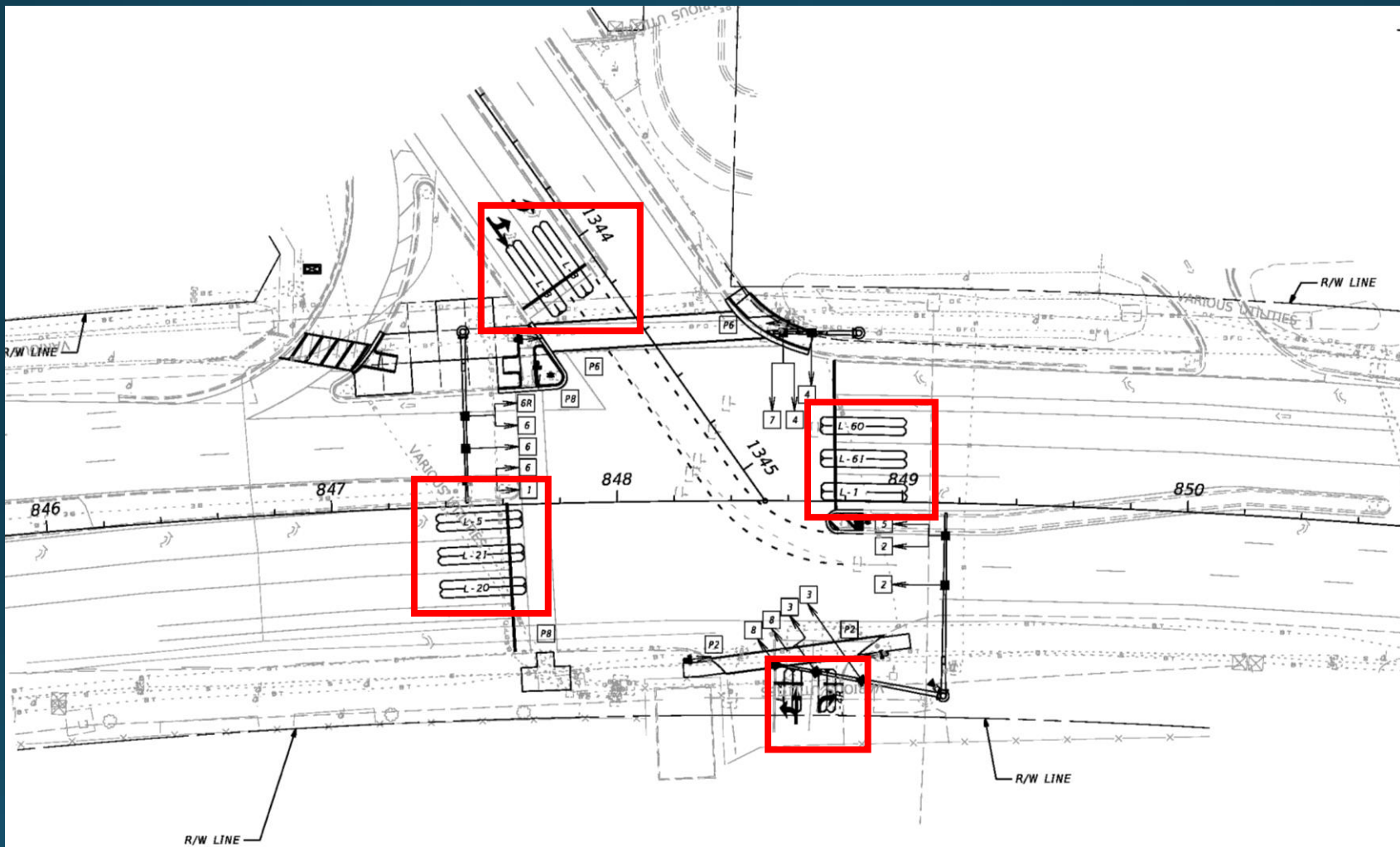
1. The "number of turns" indicated at the specified point on the loop refers to the number of passes of loop wires which are placed in the saw-cut forming the complete loop.
2. Loop types or details not drawn to scale.
3. Loop types are centered in a single lane except Type E which is centered on two lanes.
4. The number of individual loops in the Type G loop may vary up to a maximum of four (4).
5. Lead-in may be connected to either end of loop.
6. The leading edge of loop Types A.C.D.& F may extend past the stop line a maximum of 10'. The length of these loops may be extended to a maximum of 60'. Each intersection should be individually designed and if the modifications noted above is required it must be noted or detailed in the plans.
7. Loop lead-in wires should not be installed in the same pull box with signal power cable.

LAST REVISION 07/01/00	DESCRIPTION:	FDOT FY 2016-17 DESIGN STANDARDS	VEHICLE LOOP INSTALLATION DETAILS	INDEX NO. 17781	SHEET NO. 2 of 2
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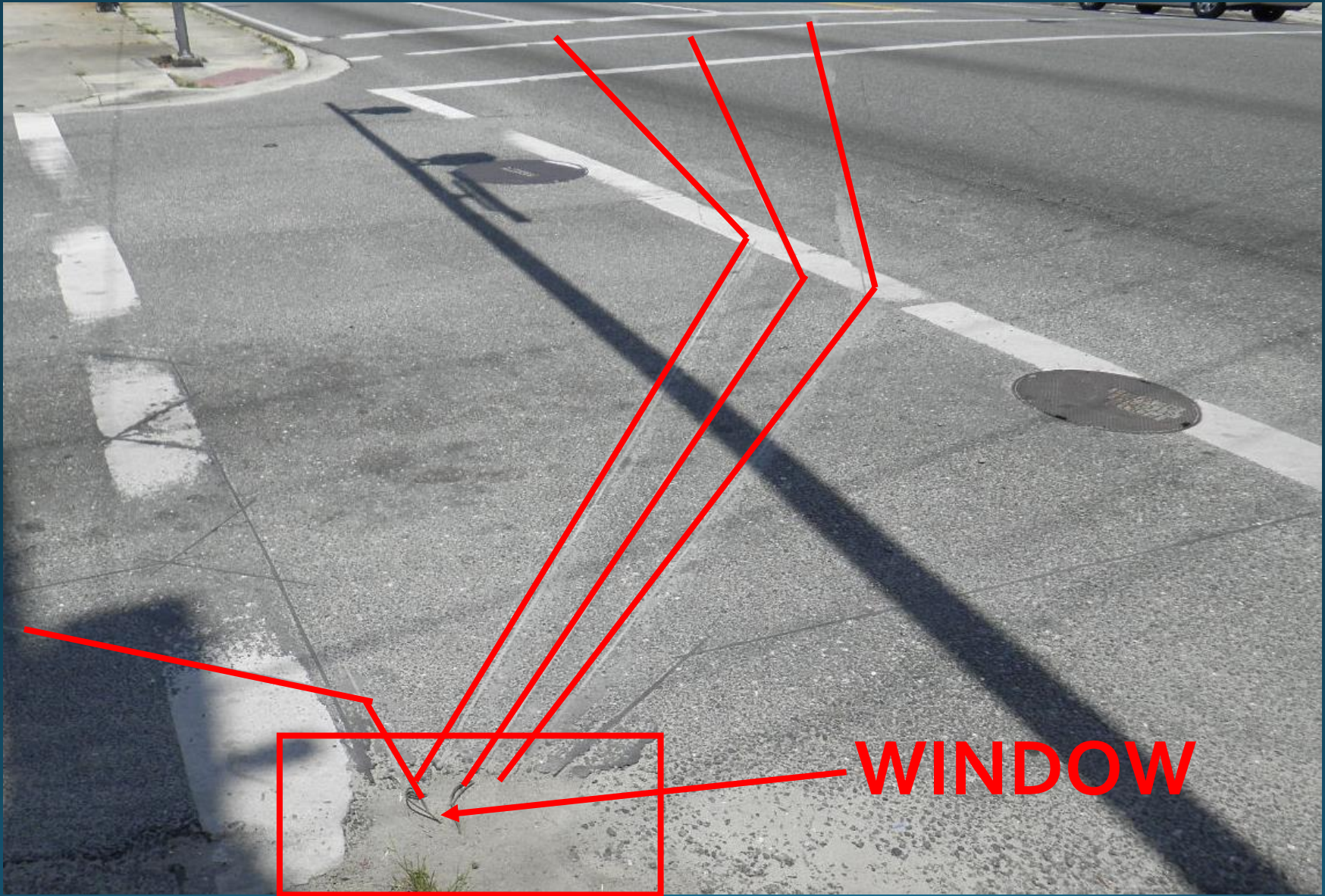
Loop Design Considerations

- Pavement condition
- Maintenance
- Curb work
- Replacement



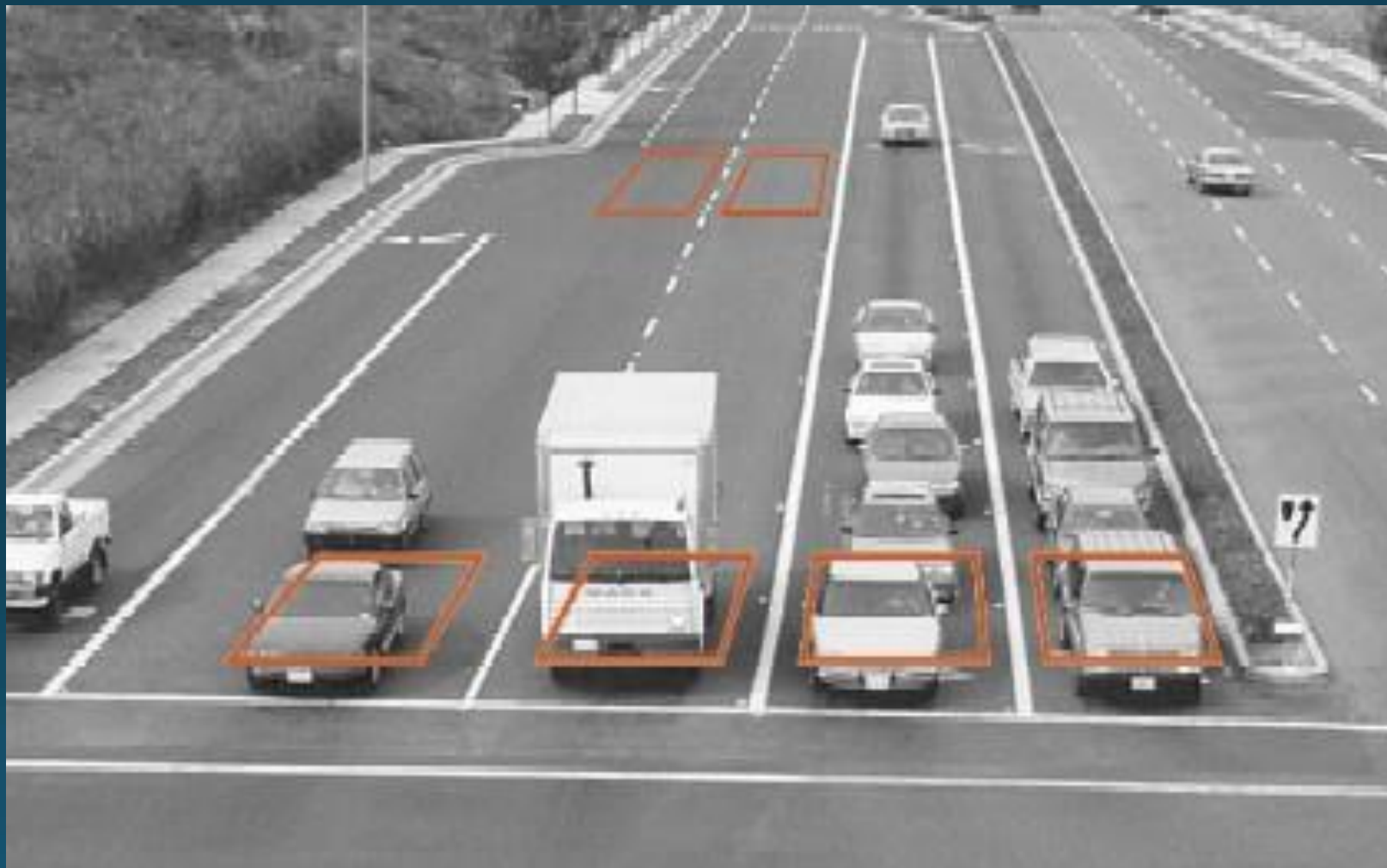


LEGEND:





Cameras

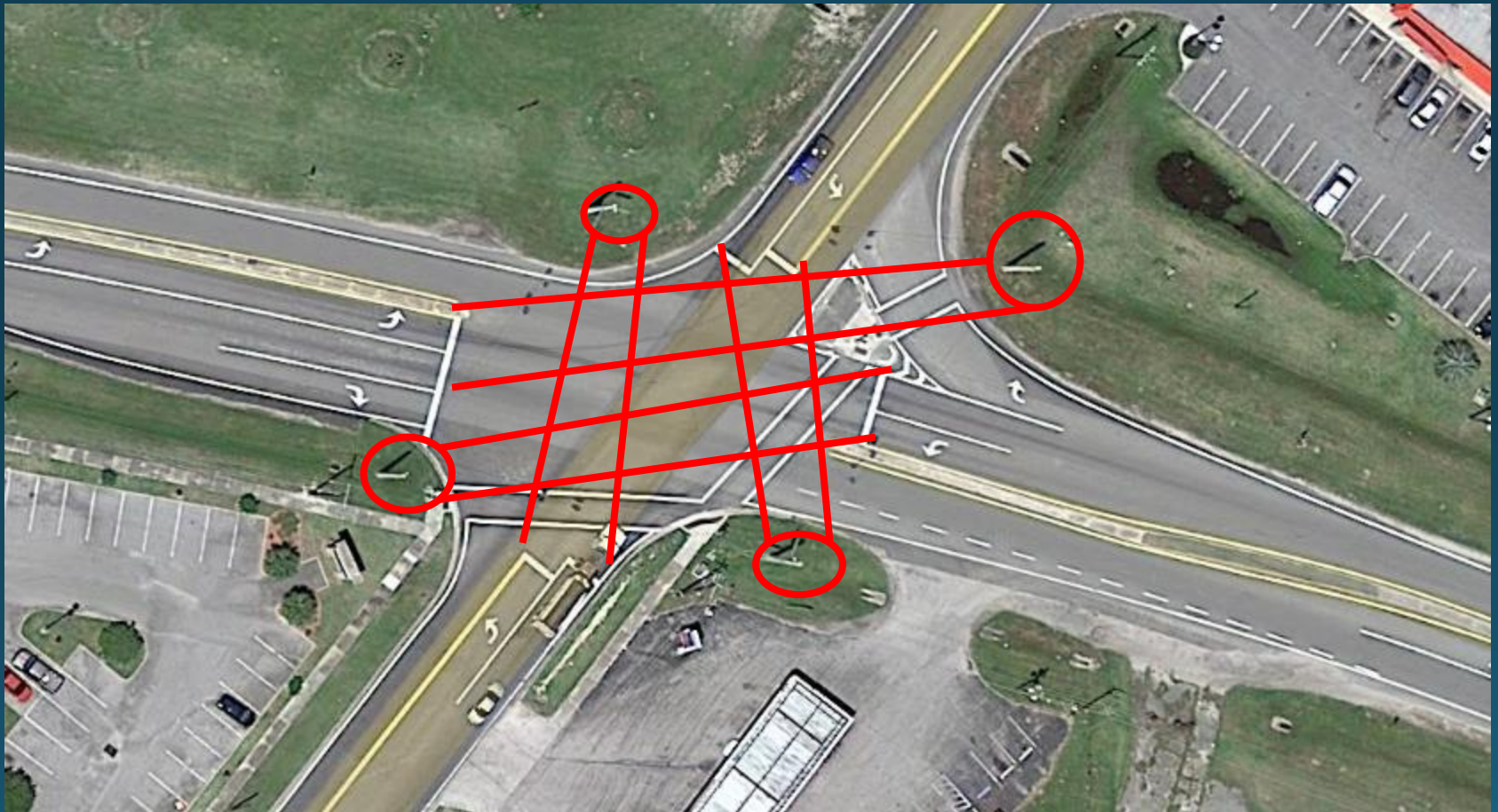


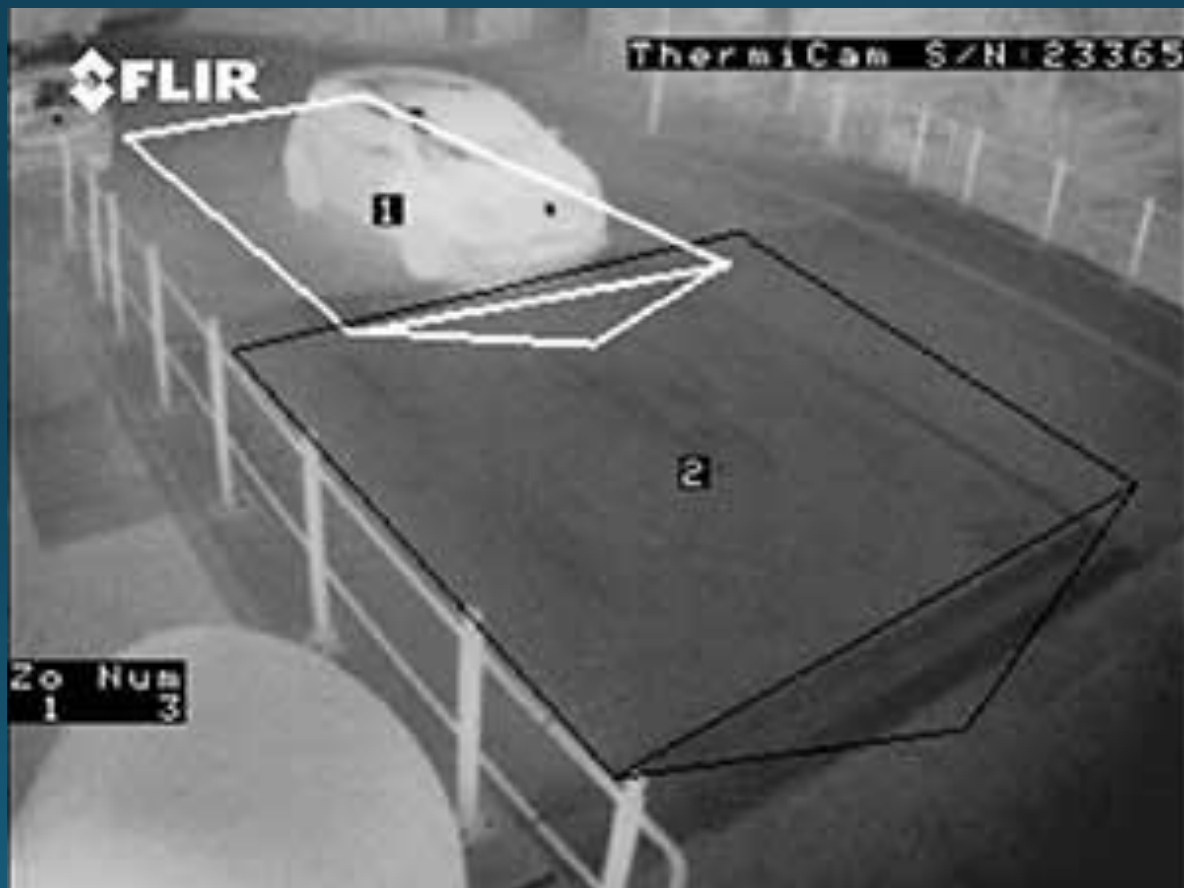
Video – Optical & FLIR

- 66o-4
- Traffic
- Mounting
- Orientation
- Weather
- Temporary detection



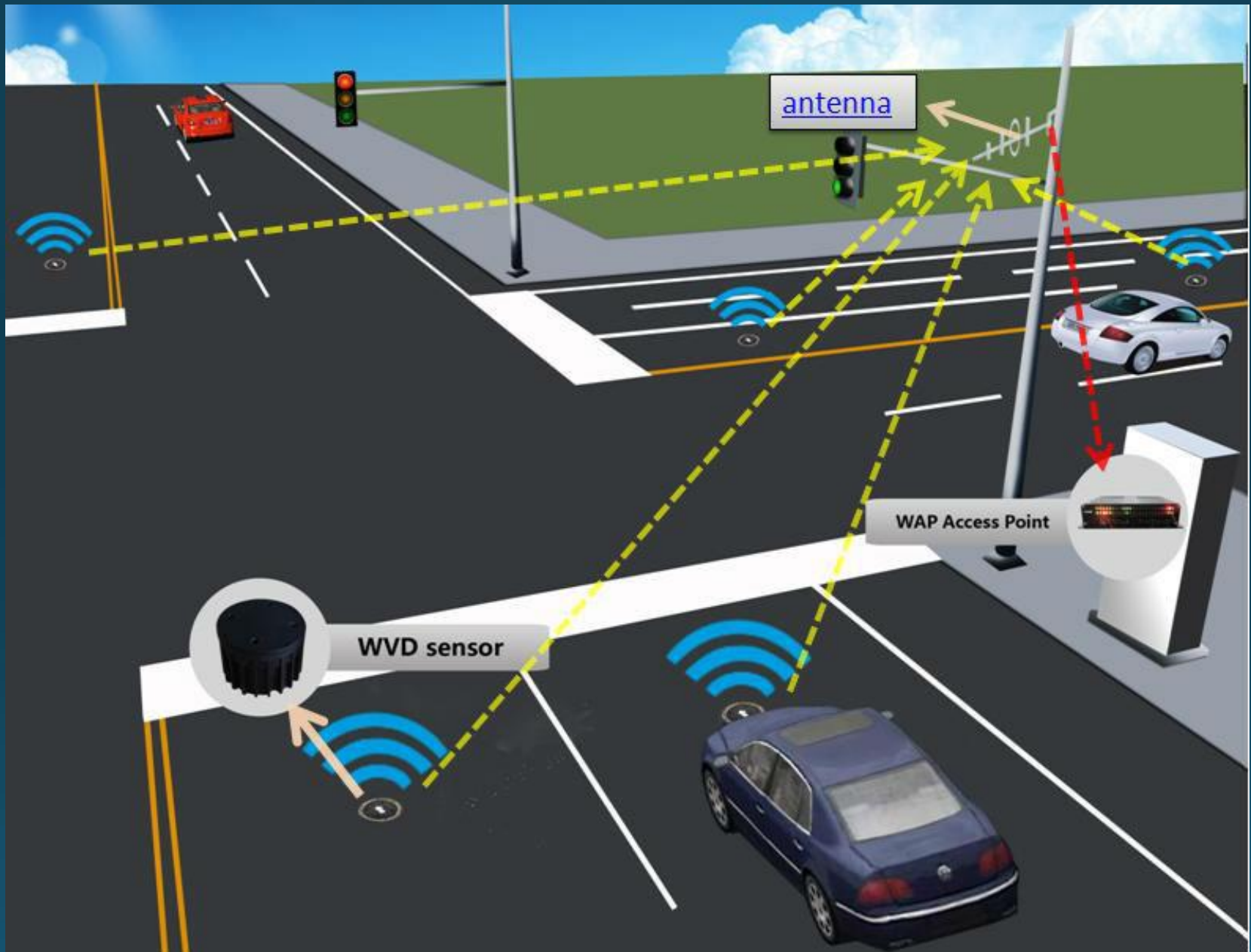
Video Design Considerations





Magnetometers

- 660-5
- Traffic
- Replacement for loops
- Wireless Signal Interruption



Detection During Construction

- Why?
- ALL projects
- Current Basis of Estimates
 - 102- 104 Temporary signalization
 - 102-107-1 Temporary detection and maintenance



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Design Considerations for Traffic Signal Timing

Signalized Intersection Level of Service

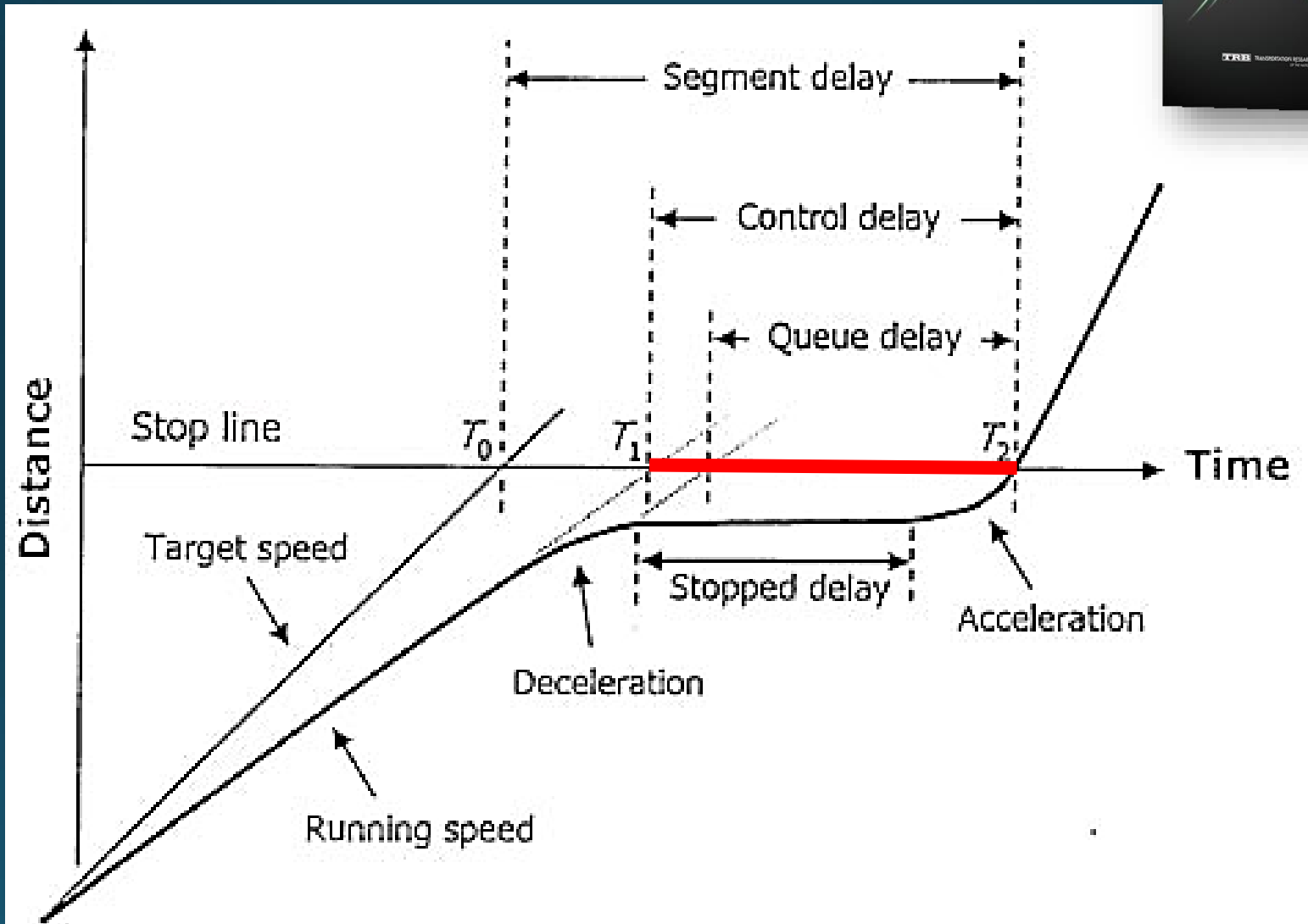


Signalized Intersection Level of Service



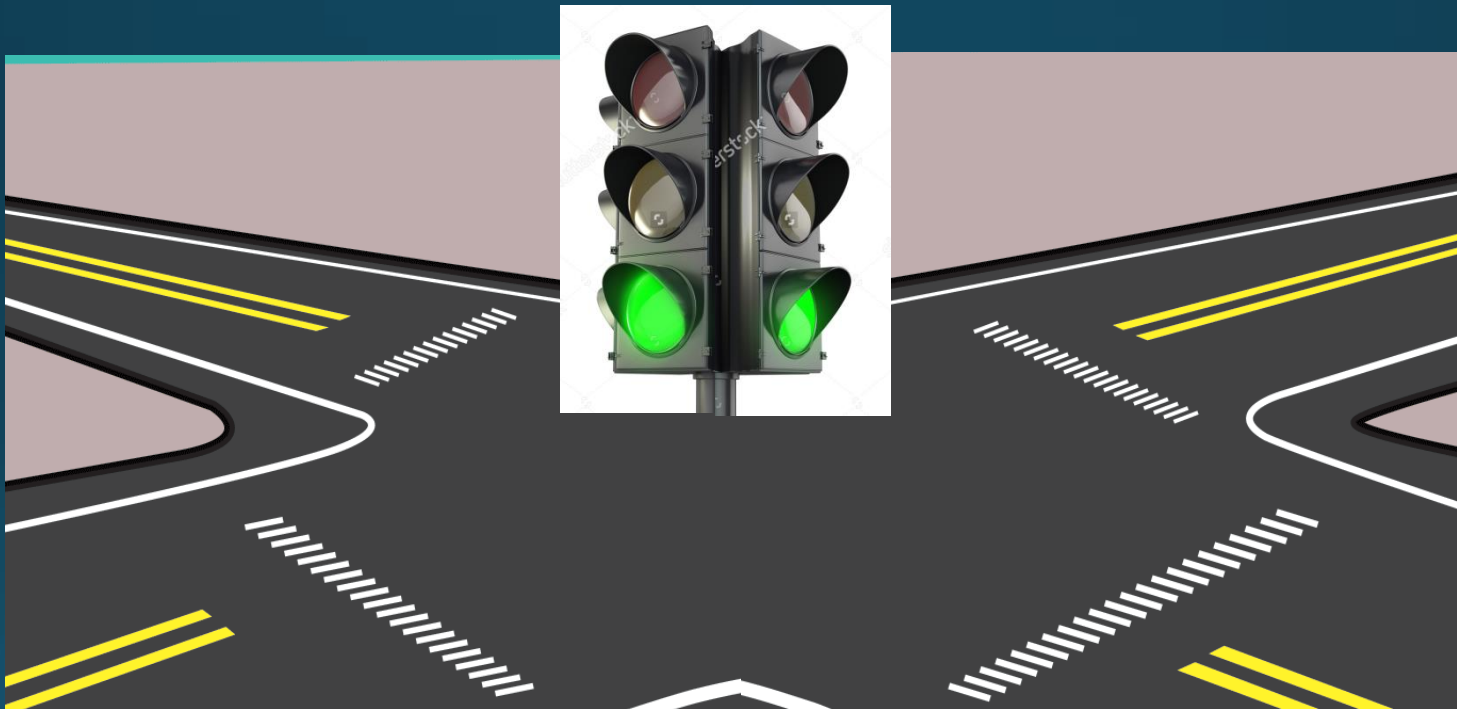
Level of Service	Average Control Delay (Seconds per Vehicle)	Description of Traffic Flow
A	≤ 10	Free Flow
B	>10 to 20	Stable Flow with Slight Delays
C	>20 to 35	Stable Flow with Acceptable Delays
D	>35 to 55	Approaching Unstable Flow with Tolerable Delays
E	>55 to 80	Unstable Flow with Intolerable Delays
F	>80	Forced Flow (Congestion and Queues Failing to Clear Intersection)

Control Delay



If we reduce Control Delay at an intersection, we improve that intersection's Level of Service.

Can Control Delay = 0?

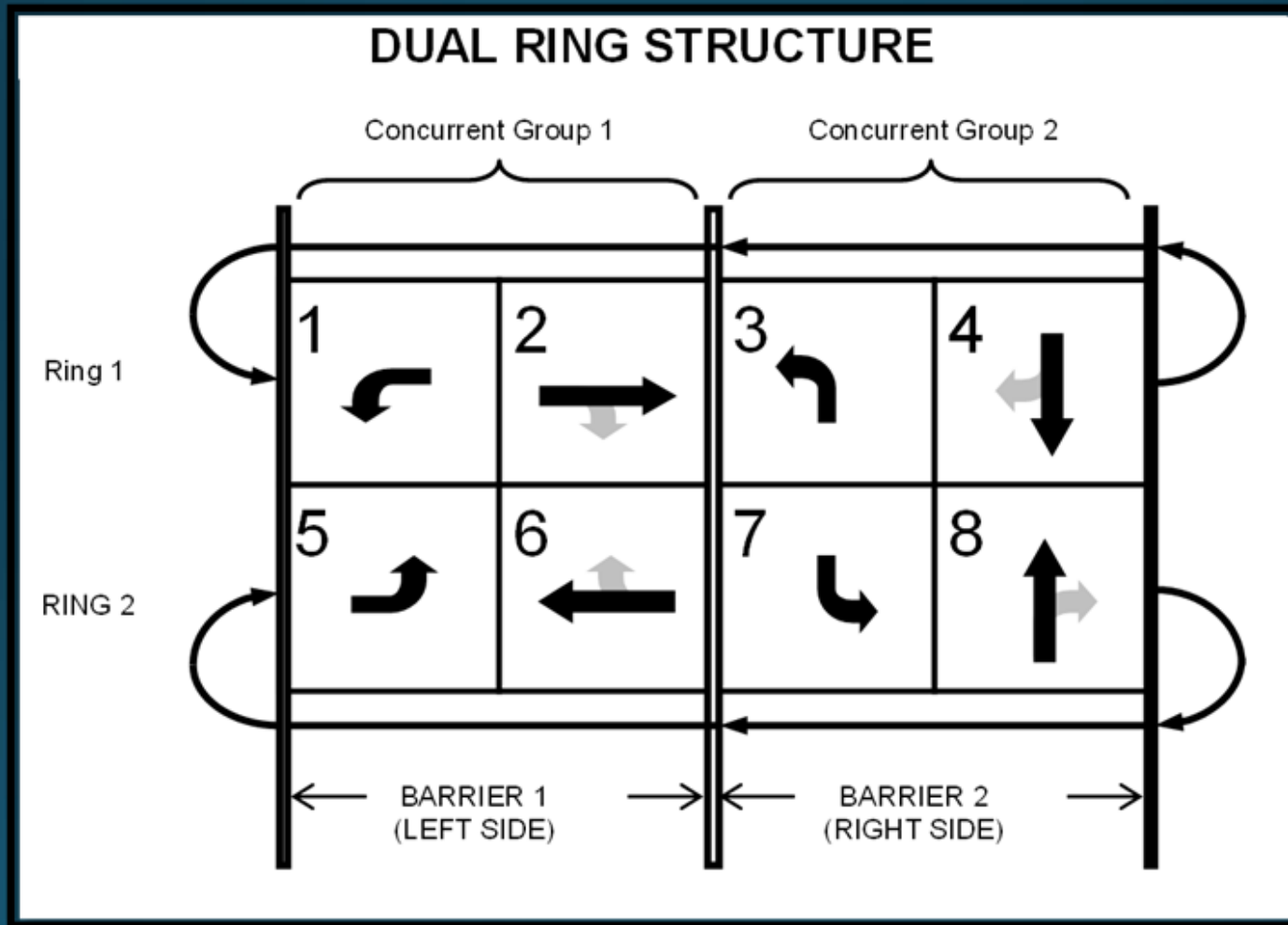




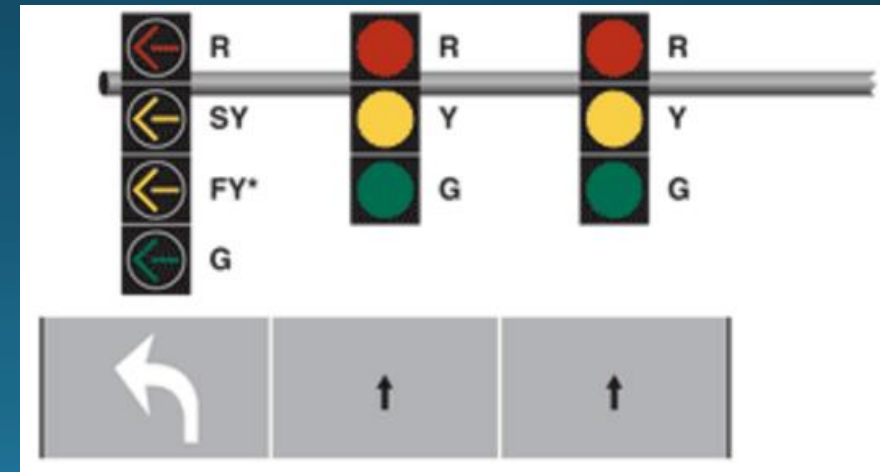
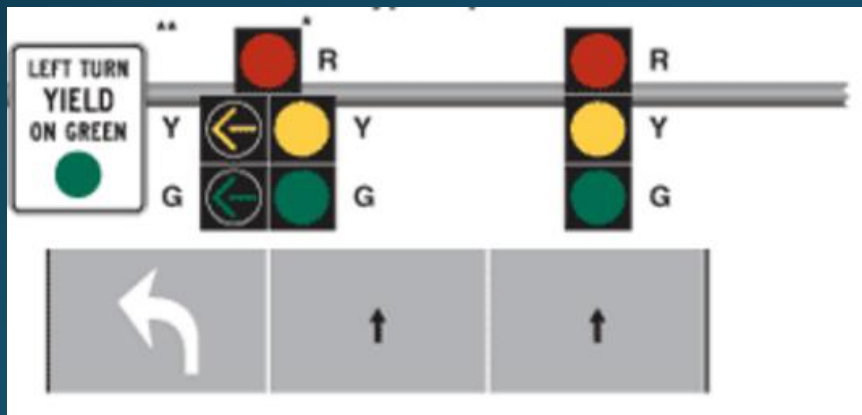
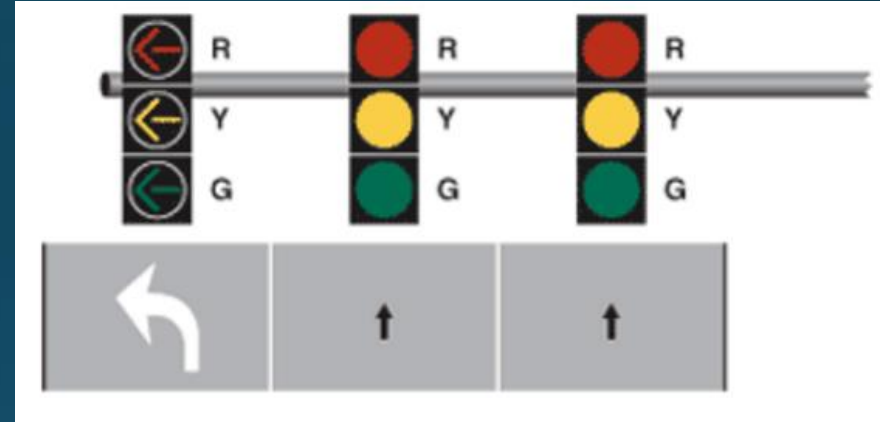
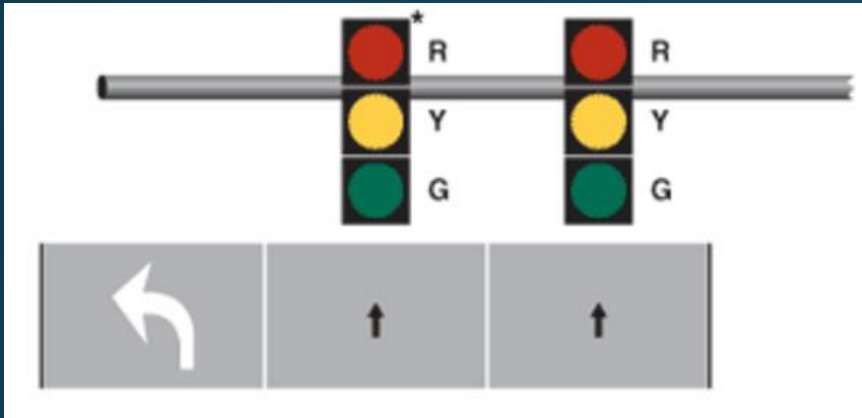
Design Features to Minimize Control Delay

- Design to minimize the number of signal phases required at an intersection.
- Design to minimize Red Clearance times
- Design to minimize Pedestrian Crossing times
- Design for the appropriate vehicular detection strategies

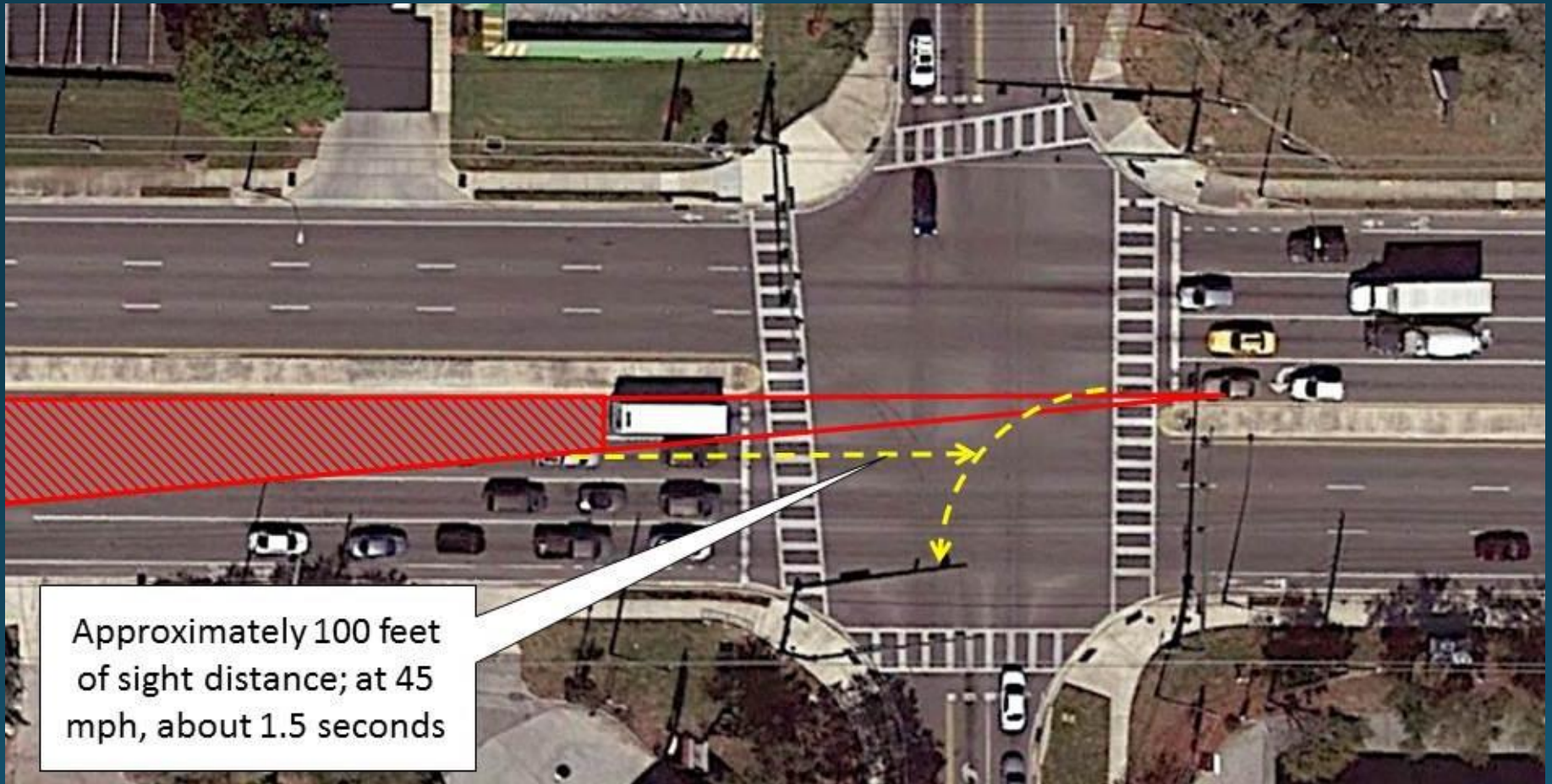
Minimize Signal Phases



Minimize Signal Phases

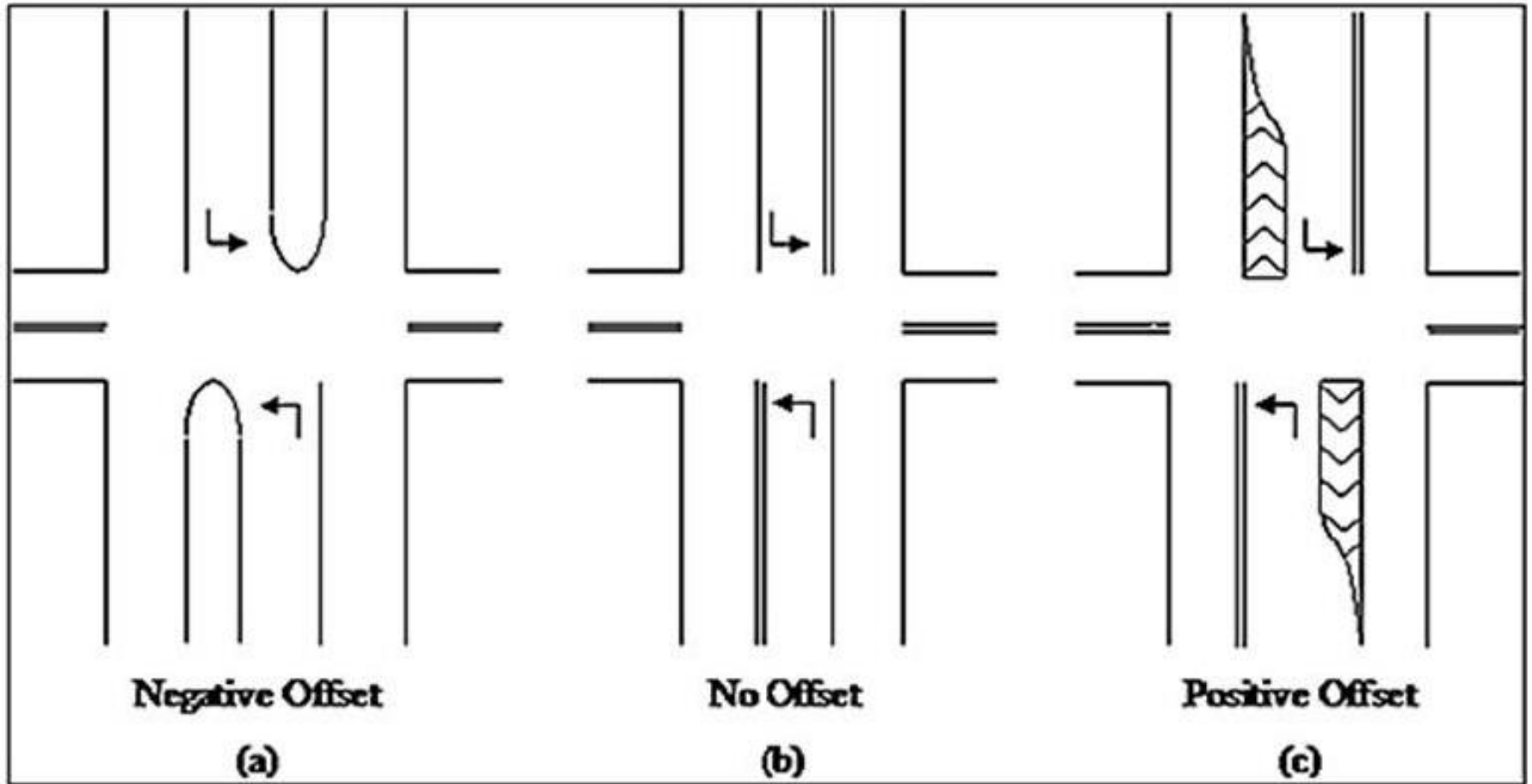


Minimize Signal Phases



Approximately 100 feet
of sight distance; at 45
mph, about 1.5 seconds

Minimize Signal Phases: Offset Left Turn Lanes



Minimize Signal Phases: Offset Left Turn Lanes



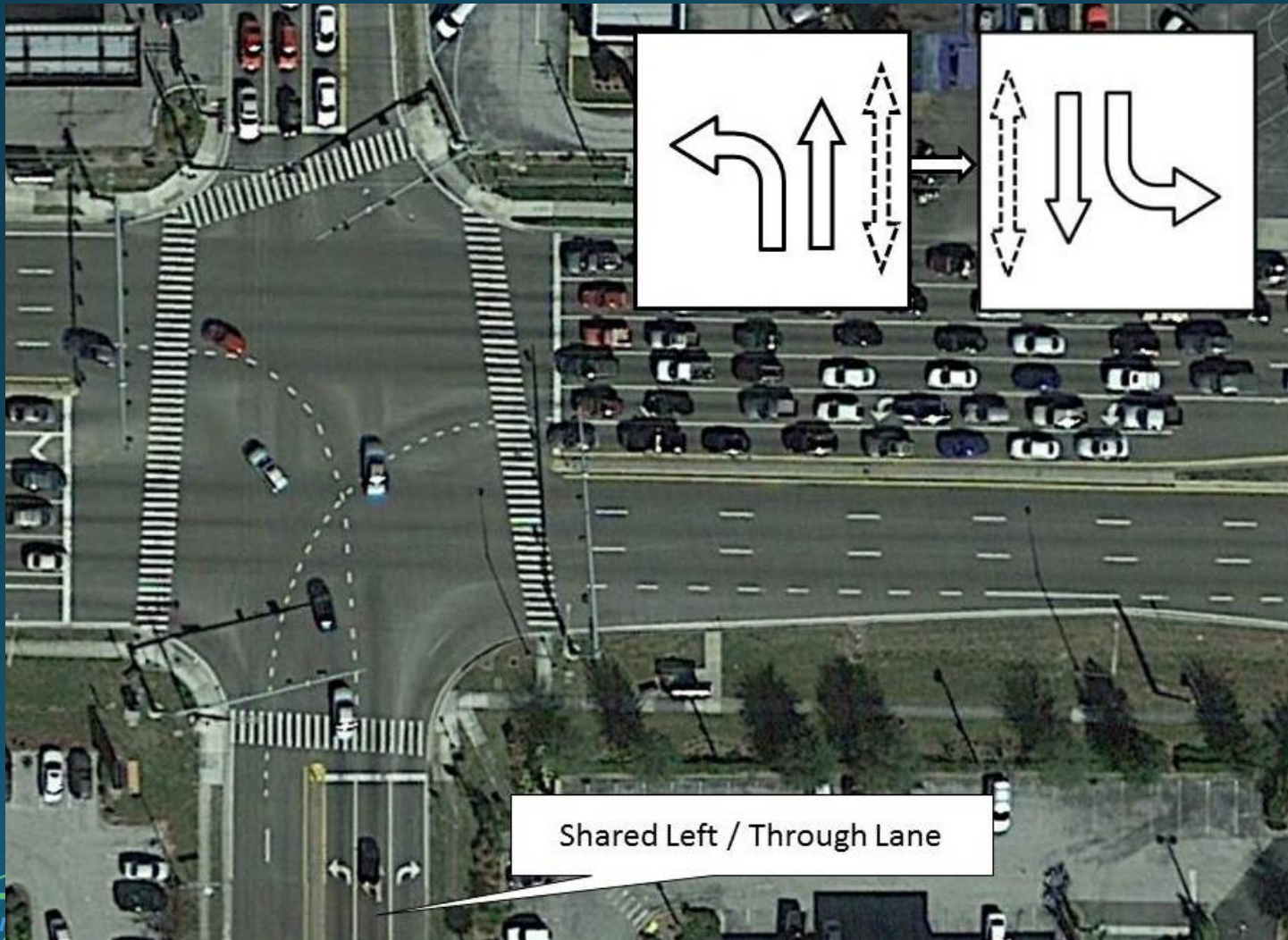
Minimize Signal Phases: Offset Left Turn Lanes



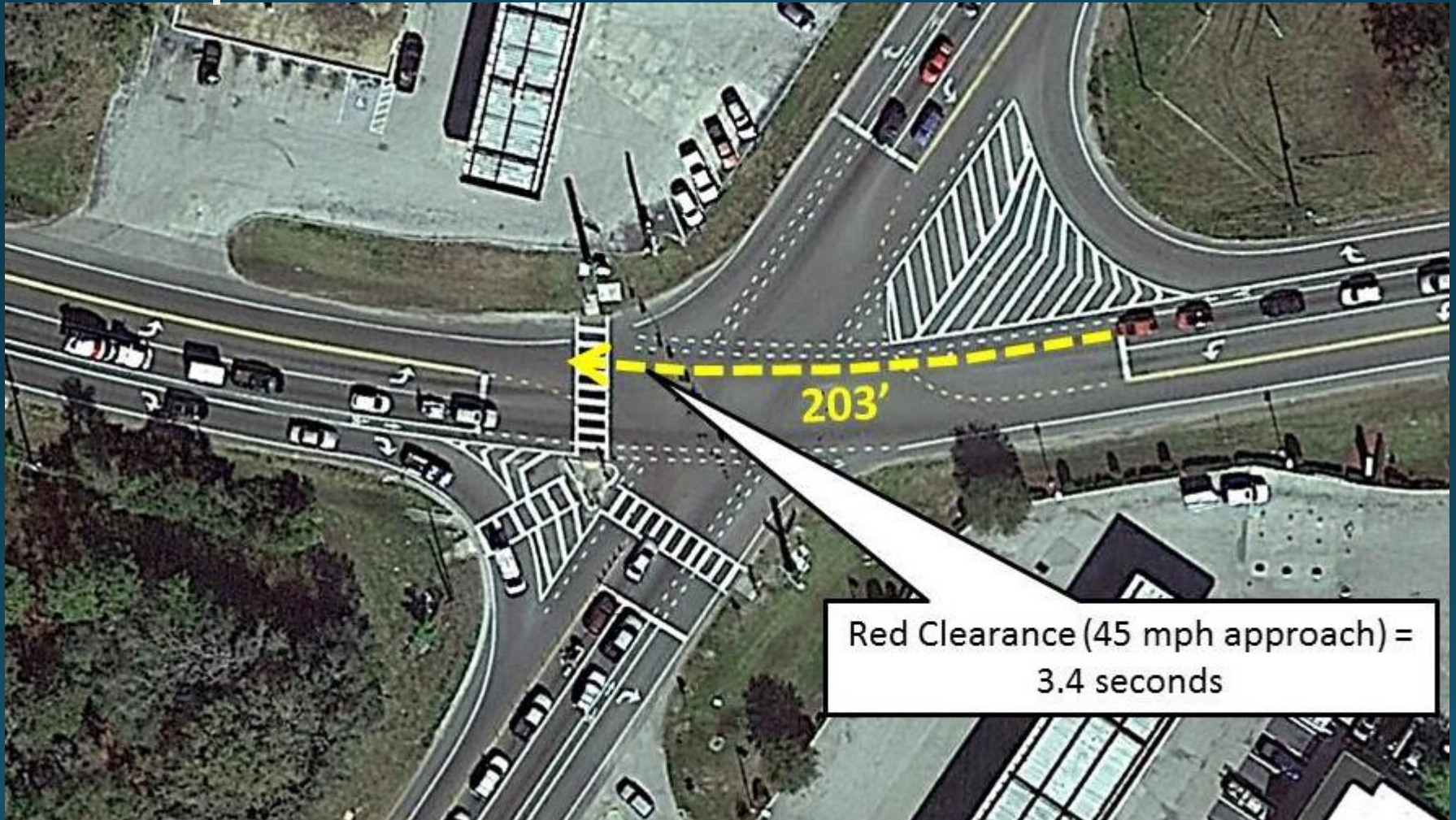
Minimize Signal Phases: Offset Left Turn Lanes



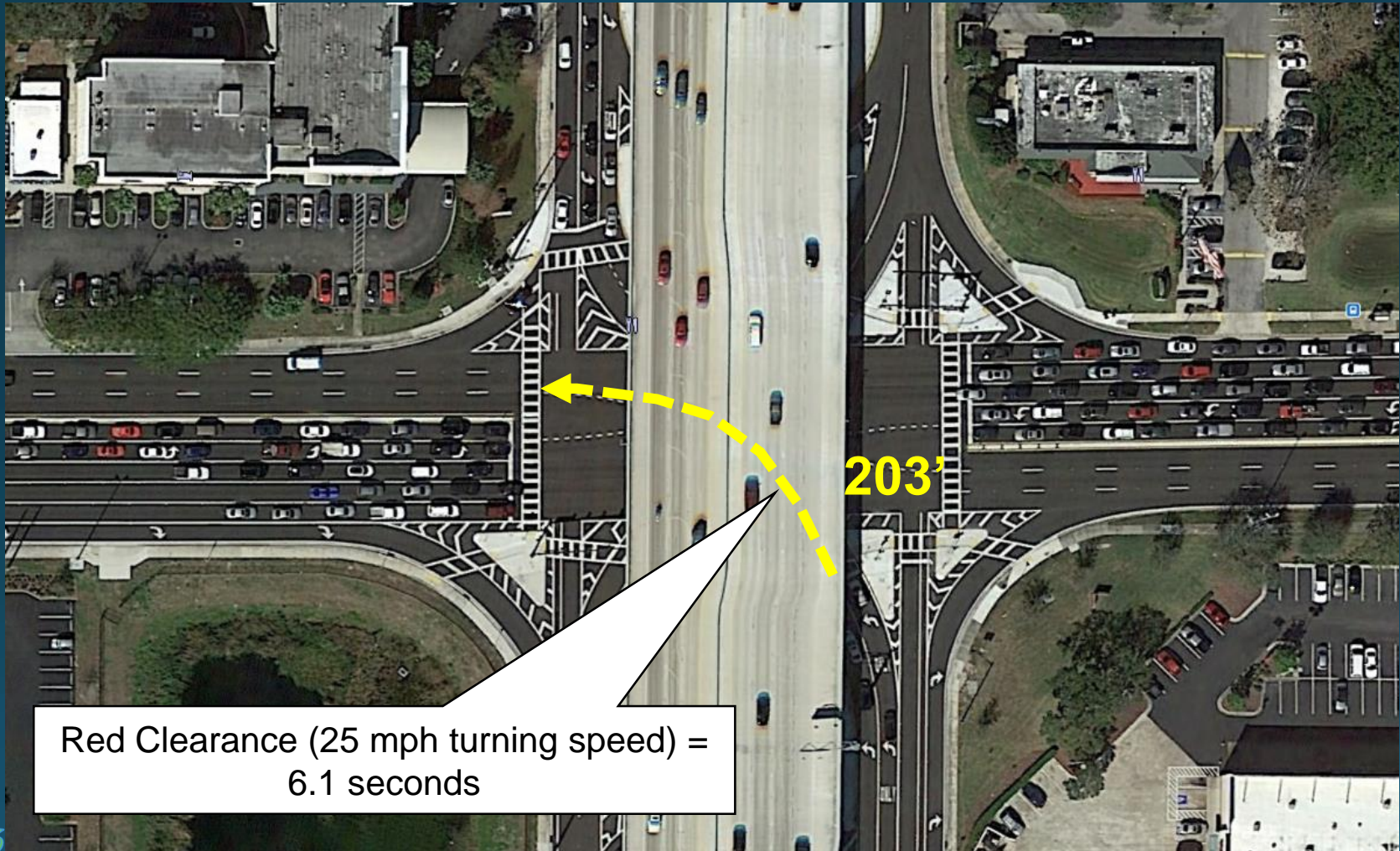
Minimize Signal Phases: Split Phasing



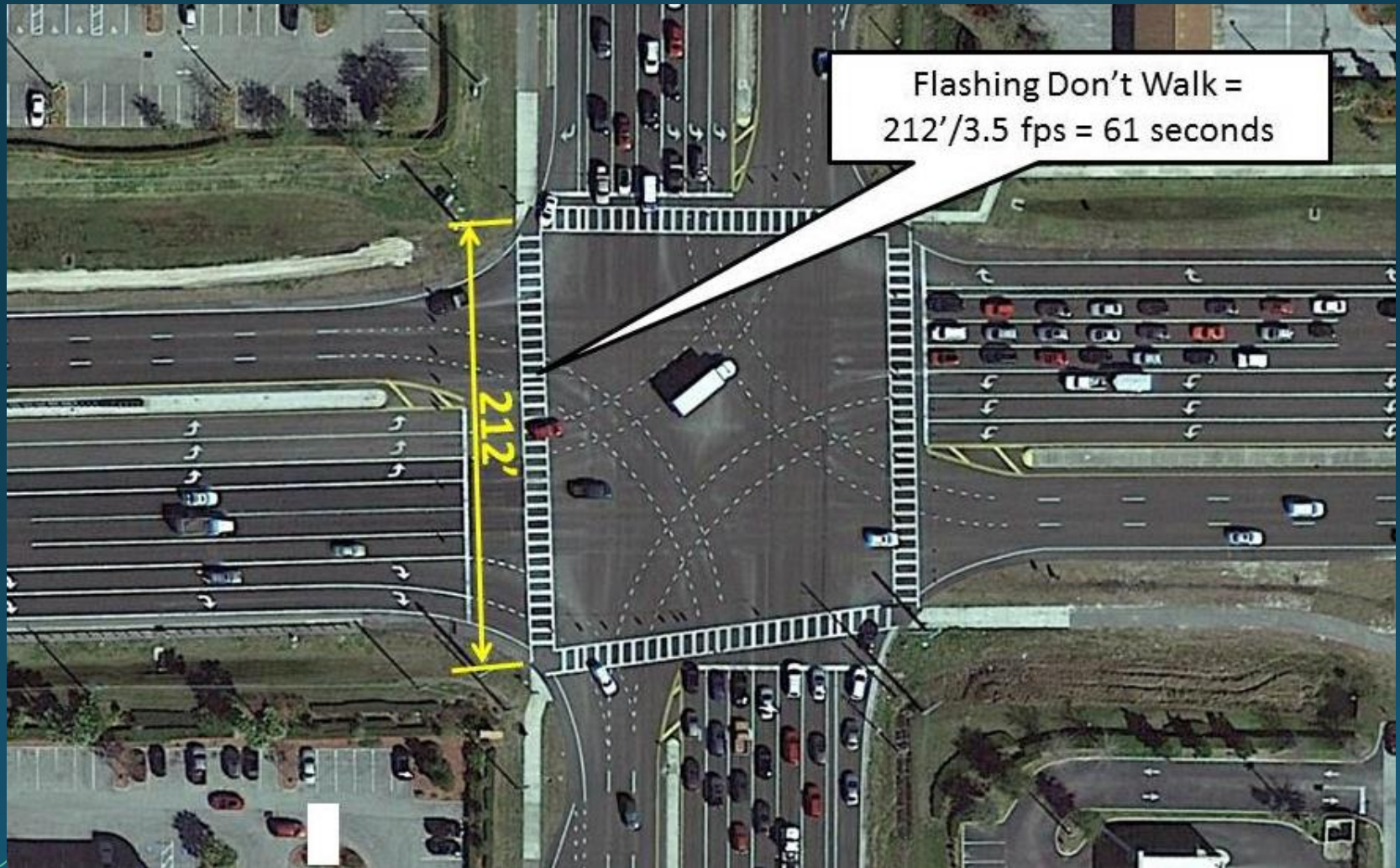
Minimize Red Clearance Times: Stop Bar Placement



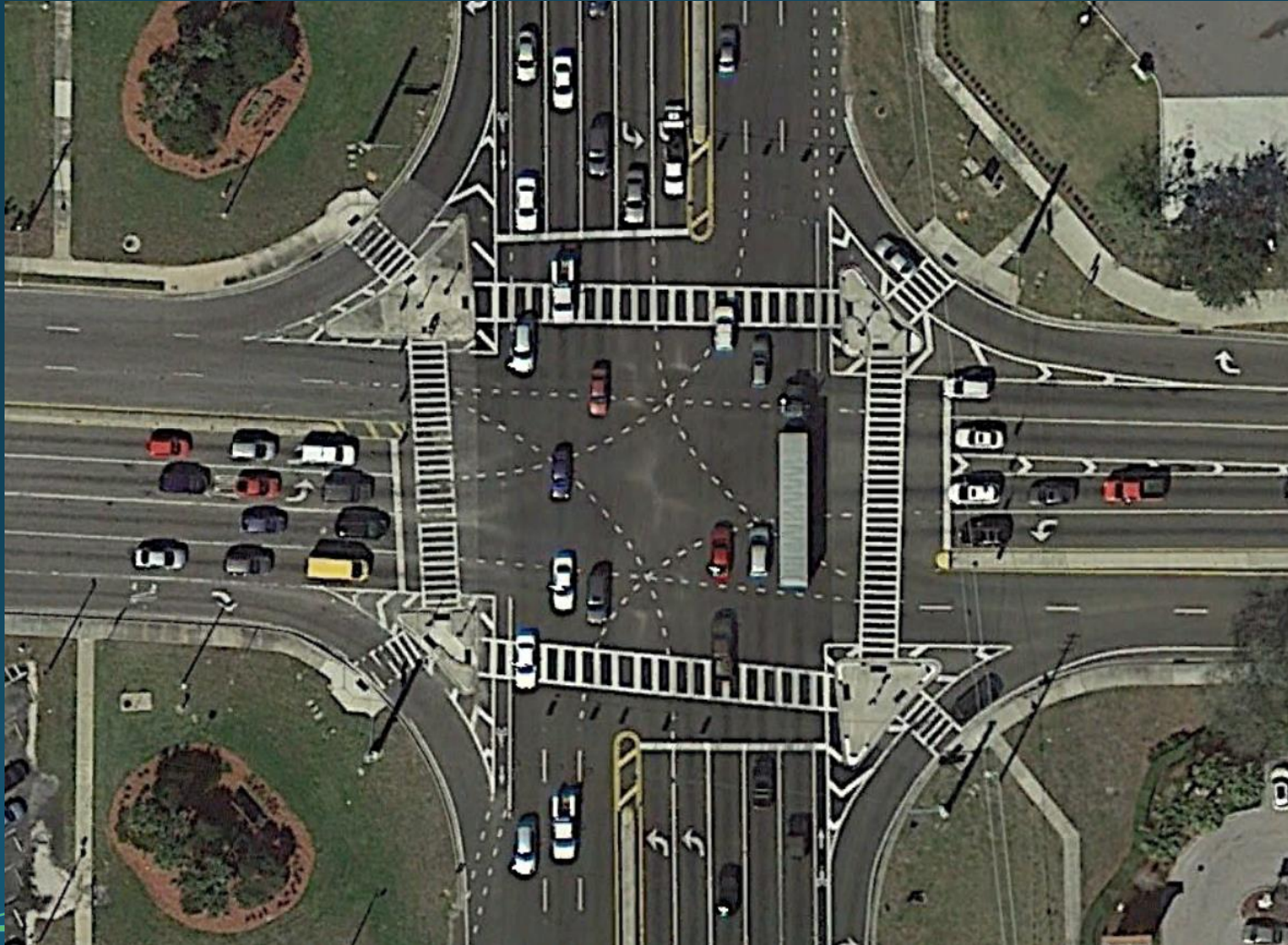
Minimize Red Clearance Times: SPUIs



Minimize Pedestrian Clearance Times: Crosswalk Lengths



Minimize Pedestrian Clearance Times: Channelizing Islands



Minimize Pedestrian Clearance Times: Two Stage Crossings



Design Appropriate Detection

